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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,272	03/31/2006	Mitsuhiro Oshiki	389.46065X00	9796
20457 7590 06/16/2011 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873				
EXAMINER SRIPURAPU, RAJEEV P				
ART UNIT 3737		PAPER NUMBER		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/574,272

**Applicant(s)**

OSHIKI ET AL.

**Examiner**

RAJEEV SIRIPURAPU

**Art Unit**

3737

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 April 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1 and 9-21 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8, 10-13, 15-16 of copending Application No. 11/577,334. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed components of transmitting and receiving units, ultrasonic probes with one or more transducers that contain electrodes to which bias' are applied, where the sensitivity can be varied with respect to the bias voltage is what is claimed or inherent in the instant application, where the electromechanical coupling coefficient is changed as a result of the bias applied to the transducers. Other limitations such as varying the frequency bandwidth, phase, and performing Doppler signal processing are rejected as being obvious design and operation choices that are well known in the art of ultrasonic transducer technology. Lastly, claim 21 of Application No. 10/574,272 is directed toward a method that is an obvious use of the claimed apparatus of copending Application No. 11/577,334.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1 and 9-21 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 8 of copending Application No. 11/913,959. Although the conflicting claims are not identical,

they are not patentably distinct from each other because the instant application explicitly discloses or inherently contains an ultrasonic apparatus that contains an ultrasonic probe with a transmitting and receiving means, where the element selecting means for selecting a plurality of oscillation elements would correspond to an inherent control means to control the switching means for applying the desired bias to the respective electrodes. Lastly, claim 21 of Application No. 10/574,272 is directed toward a method that is an obvious use of the claimed apparatus of copending Application No. 11/913,959.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1 and 9-21 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10, 12-15, and 17-19 of copending Application No. 11/571,782. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application explicitly discloses or inherently contains an ultrasonic apparatus that contains an ultrasonic probe with one or more transducer elements with a transmitting and receiving means, where other limitations including an image processing unit, a step of inputting a common drive signal or selecting a predetermined number of groups, or performing phasing addition are considered to be obvious design choices for those of ordinary skill in the art of ultrasonic transducer design and operation. Lastly, claim 21 of Application No. 10/574,272 is directed toward a method that is an obvious use of the claimed apparatus of copending Application No. 11/571,782.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 3-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,381,197 B1 to Savord et al. in view of U.S. Patent No. 6,183,419 B1 to Wildes, and in view of U.S. PG Pub. No. 2002/0198455 A1 to Ossmann et al.

Regarding claims 1, 3- 21, it is noted Savord et al. discloses a plurality of transducers (see Figure 4A for 52, 54, 56) for transmission and reception of ultrasonic waves for interrogation of objects such as solids, where inherent in the semiconductor silicon oscillation elements (MUT elements) is the characteristic of changing the

electromechanical coupling coefficient in accordance with the strength of a direct-current bias (see column 1 for lines 21-32 and lines 54-67 and column 2 for lines 21-26). Savord et al. further discloses a plurality of the oscillation elements of equal number being divided into a plurality of groups with equal intervals in a minor and major axis direction that are commonly connected, where it is also disclosed the distance between each MUT element can be varied for purposes such as aperture control, in addition to varying the gain of each MUT element to produce a different bias for each group for the purpose of apodization and elevation/image depth control (see Figure 5A for the arrangement of the MUT elements 11 a, b, c...with the MUT elements being commonly connected as shown by 1, 2, 3, V<sub>1</sub>, V<sub>2</sub>, column 5 for lines 51-57, and column 7 for lines 1-10, 29-35). Savord et al. further discloses a terminal with a distribution means that is connected to system electronics for control and bias purposes, which includes a switching means for selectively applying a bias when ultrasonic waves are transmitted and received (see column 3 for lines 61-67, column 4 for lines 1-4, Figure 4A for 1-3, 57a-c, 32). Savord et al. further discloses a method for biasing a plurality of oscillation elements where an electromechanical coupling coefficient would inherently be changed, to transmit and receive ultrasonic waves to an object for reconstruction of an ultrasound image, where an imaging processing and storage means would be inherent for these processes (see column 2 for lines 49-64 and column 8 for lines 4-8). Further, inherent would be a correction control means for the process described by Savord et al. to dynamically vary the apodization and aperture control, in a continuous manner, where the bias change would incorporate a correction of the electromechanical

coupling coefficient (column 6 for lines 51-53). Savord et al. lastly discloses applying a bias having weight for groups of MUT elements either symmetrically with increasing bias towards the center of the aperture, or asymmetrically with a moving window with respect to the center of an ultrasonic aperture, thereby providing for the ability to control the lateral aperture by selectively controlling the activation of the MUT elements (see column 4 for lines 36-67, column 6 for lines 26-49, column 7 for lines 16-53).

Importantly, Savord teaches that varying the number of energized elements directly impacts the focal depth of imaging process (see Fig. 4A, col 5). Moreover, the Savord arrangement of groups and elements reduces the number of switches necessary to activate the elements and thus teaches an efficient system. But, Savord does not specifically disclose adjusting the depth based on energizing different numbers of sections of oscillating elements in different groups.

However, Wildes teaches that varying the number of elements can directly impact the quality and focal depth of imaging (see Fig. 7, Fig. 8, and col 8 ln 1-64). Wildes also discloses that varying groups of sections and elements can be arranged to optimize the clarity and focal depth of imaging (see Fig. 7, Fig. 8, and col 8 ln 1-64), noting the various shaded regions of sections and elements). Moreover, the disclosure of Wildes teaches that varying configurations of sections and groups can lead to better sharpness, focus, and resolution at varying depths (see col 8 ln 1-64).

Consequently, it would have been obvious to one of skill in the art at the time of the invention to have combined the teachings of Savord with the variable groupings of Wildes because doing so would create an efficient device with minimal electronic



elements that would improve focus, sharpness and resolution of imaging at various depths. Finally the combined device of Savord and Wildes would adjust the number of sections in groups based on the depth of imaging required.

In addition, it appears that current claims describe a device that adds an additional subdivision to a series of subdivisions to achieve greater control over elements. However, this would have been obvious to one of skill in the art as mere rearrangement of parts and further in light of Savord and Wildes because both references teach the importance of subdividing elements in order to maximize resolution and other quality factors of imaging at various depths of imaging.

It appears that Wildes discloses varying the number of elements to vary focal depth and that Wildes teaches changing the number of elements as the position gets closer to the center of the ultrasonic aperture along a minor axis direction to create specific receive and transmit patterns (see Fig. 5, Fig. 6, Fig. 7, Fig. 8, and col 8 In 1-64). But, Wildes does not specifically enumerate that the number of elements increases along the short axis in the direction of the center of the ultrasonic aperture.

However, Ossman discloses a similar ultrasound transducer control, wherein the apodization profile of an ultrasonic transducer array is controlled by altering the transducer elements (see abstract). Additionally, Ossman discloses a variety of patterns and control schemes for generating said patterns, wherein the pattern energy increases towards the center of the ultrasound aperture along a minor axis direction in order to reduce side lobes and to increase precision (see Fig. 1B, para [0004], para [0024]-[0025], para [0034]-[0038, and para [0043]-[0044])). As noted above a skilled

artisan would know that said pattern could be created by increasing the size (Savord Fig. 6B) or number of elements activated in the transducer (Savord and Wildes). Consequently, a skilled artisan would have combined the teachings of Savord, Wildes, and Ossman to create a device, wherein the number of elements increases towards the center of the aperture along a minor axis direction in order to create a transmit/receive pattern that reduces side lobes, increase precision, and accurately transmits and receives signals at specific depths.

### ***Response to Arguments***

Applicant's arguments with respect to Claims 1 and 3-21 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAJEEV SIRIPURAPU whose telephone number is (571)270-3085. The examiner can normally be reached on Monday-Thursday 8:30-6:00 and on Friday 8:00-12:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, BRIAN CASLER can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rajeev Siripurapu/  
Examiner, Art Unit 3737

/BRIAN CASLER/  
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